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COURSE BROCHURE

Advanced High-Voltage Breaker Testing and Mechanism Overhaul Training Course

22 February – 5 March 2027
London

Advanced High-Voltage Breaker Testing and Mechanism Overhaul Training Course

Ref: 833_31634 **Date:** 22 February – 5 March 2027 **Location:** London **Fees:** 9500 GBP

High-Voltage Breaker Testing and Mechanism Overhaul is a 2-week advanced training course for electrical maintenance engineers and substation technicians who diagnose vacuum, SF6 and air breakers and decide when a mechanism needs rebuilding, and who leave with a breaker condition and overhaul register. Ageing switchyards and rising fault levels make interrupter health a direct reliability risk. The course is delivered by Jupiter Prime Training.

Why High-Voltage Breaker Testing and Mechanism Overhaul Matters Now

Three pressures shape breaker upkeep. Many installed interrupters are approaching the end of their design operations count, utilities and industrial plants want fewer planned outages, and environmental pressure on SF6 gas handling is growing. A site that reads timing, travel and contact resistance trends well can defer intrusive work and target the right poles; a site that relies on fixed intervals risks failures to trip, slow clearing and avoidable gas losses. The course rests on ISO 55001 for asset management systems, EN 13306 for maintenance terminology, and the SMRP Best Practices Metrics and Guidelines for measuring maintenance effectiveness.

Who Gains Most from High-Voltage Breaker Testing and Mechanism Overhaul

- Engineers who interpret breaker test signatures and approve return to service
- Technicians who run timing, travel and micro-ohm measurements in the switchyard
- Specialists who rebuild spring, hydraulic and pneumatic operating mechanisms
- Planners who schedule outages and spare interrupter stock across substations
- Authorised persons who issue switching instructions and isolation certificates

A substation maintenance crew gains most when its test engineer, mechanism fitter and switching authority attend together and agree shared acceptance limits.

High-Voltage Breaker Testing and Mechanism Overhaul Capabilities

Participants turn raw test traces into a defensible decision about each pole, drive and interrupter.

- Test opening and closing times, pole spread and contact travel against maker limits — return-to-service decision
- Calculate contact wear from micro-ohm readings and interrupted fault current — interrupter replacement timing
- Assess SF6 density, moisture and decomposition results — gas handling and leak repair priorities
- Specify mechanism overhaul tasks for spring, hydraulic and pneumatic drives — outage scope
- Apply condition scoring to rank breakers across a fleet — capital renewal planners
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Communicate safe switching and isolation steps for breaker work — authorised switching staff

Key High-Voltage Breaker Testing and Mechanism Overhaul Terms

- Contact travel curve — a trace of moving contact position against time, revealing damping, overtravel, rebound and mechanism friction.
- Pole discrepancy — the time difference between the fastest and slowest pole during opening or closing, a sign of linkage wear.
- Static contact resistance — micro-ohm measurement across closed main contacts, showing erosion, contamination or loose joints.
- Dynamic resistance measurement — contact resistance recorded during operation to assess arcing contact length in SF6 interrupters.
- Vacuum integrity test — a high-voltage withstand check across an open vacuum bottle to confirm internal pressure is still adequate.
- First-trip test — timing the very first operation after long standstill to expose sticky latches and dried lubricant.

High-Voltage Breaker Testing and Mechanism Overhaul Day by Day

Day 1: Interrupter Fleet Risks and Duty

- Breaker Population Profiling — Ranking Age, Duty and Fault Exposure
- Interruption Physics in Vacuum, SF6 and Air — Choosing Test Emphasis
- ISO 55001 Asset Objectives — Linking Breaker Health to Network Reliability
- Failure-to-Trip Case Reviews — Learning From Utility and Refinery Incidents
- EN 13306 Failure Modes Vocabulary — Recording Breaker Defects Consistently

Day 2: Operating Mechanisms in Depth

- Spring Charging Drives — Inspecting Motors, Ratchets and Latches
- Hydraulic Mechanisms — Checking Accumulator Pressure and Pump Run Times
- Pneumatic Drives — Verifying Air Receivers, Valves and Dryers
- Trip and Close Coil Currents — Detecting Armature Sticking Early
- Damper and Dashpot Settings — Controlling Rebound and Contact Bounce

Day 3: Timing and Travel Diagnostics

- Timing Analyser Connection Plans — Avoiding Induced Voltage Errors
- Opening and Closing Time Limits — Judging Results Against Maker Data
- Travel Transducer Mounting — Capturing Speed and Overtravel Accurately
- Pole Discrepancy Evaluation — Deciding Linkage Adjustment Needs
- First-Trip Testing Practice — Revealing Latch and Lubricant Problems

Day 4: Contact Condition and Resistance

- Micro-Ohm Measurement Method — Selecting Current and Probe Positions
- Dynamic Resistance Signatures — Estimating Arcing Contact Length
- Cumulative Interrupted Current Tracking — Forecasting Contact Erosion
- Both-Sides-Grounded Testing — Working Safely in Live Switchyards
- Contact Inspection Criteria — Accepting, Dressing or Replacing Parts

Day 5: Insulation and Vacuum Checks

- Insulation Resistance and Polarisation Index — Screening Moisture Ingress
- Power Frequency Withstand Tests — Confirming Dielectric Margins
- Vacuum Bottle Integrity Checks — Spotting Loss of Vacuum Early
- Grading Capacitor Measurements — Detecting Drift in Multi-Break Units
- Bushing and Support Insulator Inspection — Planning Cleaning or Coating

Day 6: SF6 Gas Care and Handling

- Gas Density Monitors — Interpreting Alarms and Lockout Stages
- Moisture, Purity and Decomposition Testing — Judging Gas Reuse
- Leak Detection Methods — Locating Losses at Flanges and Seals
- Gas Recovery Carts — Running Evacuation and Refill Safely
- Gas Inventory Records — Reporting Losses to Environmental Owners

Day 7: Condition Scoring and Overhaul Choices

- Breaker Health Index Model — Combining Test Results Into One Score
- Operations Counter Analysis — Comparing Mechanical Duty With Endurance Class
- Overhaul Versus Retrofit Versus Replace — Weighing Life Cycle Cost
- Spare Interrupter Strategy — Sizing Stock Across Substations
- SMRP Maintenance Metrics — Tracking Preventive Compliance and Rework

Day 8: Mechanism Overhaul Execution

- Mechanism Strip-Down Sequence — Recording Wear on Pins and Bearings
- Lubricant Selection and Renewal — Preventing Sluggish Operation
- Seal and Gasket Replacement — Restoring Hydraulic and Gas Tightness
- Post-Overhaul Adjustment — Setting Latch Gaps and Spring Charge
- Commissioning Test Set — Proving Readiness Before Energisation

Day 9: Safe Switching and Outage Control

- Switching Programme Writing — Sequencing Isolation and Earthing Steps
- Isolation Certificates and Permits — Controlling Access to Breaker Bays
- Interlock Verification — Confirming Mechanical and Electrical Blocking
- Arc Flash Boundaries for Breaker Work — Selecting Protective Equipment
- Outage Window Planning — Bundling Tests With Protection Checks

Day 10: Practising the Breaker Condition and Overhaul Register

- Utility Substation Case — Applying Timing and Resistance Trends
- Petrochemical Switchboard Case — Applying Vacuum and Insulation Checks
- Fleet Ranking Exercise — Applying the Health Index to Mixed Technologies
- Switching Programme Critique — Testing Isolation Logic Against Interlocks
- Breaker Condition and Overhaul Register — Completing the Site Version

Applying High-Voltage Breaker Testing and Mechanism Overhaul After the Course

- Run first-trip and travel curve tests on the five oldest breakers on site and compare results with maker limits.
- Build a health index sheet for one substation and use it to propose the next outage scope.

High-Voltage Breaker Testing and Mechanism Overhaul Questions FAQ

What is high-voltage breaker testing and mechanism overhaul, and why does it matter now?

It is the practice of measuring breaker timing, travel, contacts, insulation and gas, then rebuilding drives when results demand it. It matters now because installed fleets are ageing while outage windows shrink and gas handling faces closer scrutiny.

Which roles gain most from high-voltage breaker testing and mechanism overhaul?

Electrical maintenance engineers, substation technicians, mechanism fitters, outage planners and switching authorities gain most. Each acts on test results or controls access to breaker bays, so shared limits and vocabulary speed decisions.

How does high-voltage breaker testing and mechanism overhaul differ from a general switchgear course?

It goes deeper into diagnostics and drive rebuilding than a general switchgear course. Broader courses cover panels, relays and busbars, while this one concentrates on interrupter physics, test signatures, SF6 care and mechanism overhaul decisions.

What do you bring back from high-voltage breaker testing and mechanism overhaul?

You bring back a condition and overhaul register for your own breaker fleet. It ranks each unit by test evidence, states acceptance limits and lists the overhaul or replacement action for the next outage.

High-Voltage Breaker Testing and Mechanism Overhaul: The Way Forward

The breaker condition and overhaul register first informs which units enter the next outage scope. Test engineers, fitters and planners use it to align test sets, spare interrupters and switching programmes. After its first use, the health index weightings deserve another look, since fresh timing and resistance trends will show which indicators predict defects most reliably.